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Abstract

Research which can form new bases for interior design is being greatly accelerated. Investigations in psychology, anthropology, psychiatry, and biology, as well as interdisciplinary projects, turn up literally hundreds of studies, the results of which will vitally affect interior design. This body of research falls into two parts--(1) human engineering and measurement, usually referred to as human factors in the United States and ergonomics in England and Europe, which is primarily concerned with creating designs to match human capacities and limitations, and (2) a cross-disciplinary and multi-disciplinary collection which includes, but is not limited to, anthropology, psychology, biology, medicine, statistics, and various forms of engineering. The more useful of them concentrate on human reactions to interior space and artifacts. From this breakdown of disciplines, the interior designer emerges as a job captain, aware of and familiar with the growth of knowledge in the behavioral sciences, and more importantly, ready to call upon each specialist as needed. A bibliography is included. (KK)

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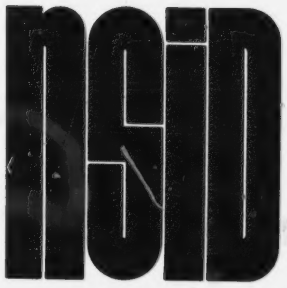

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The National Society of Interior Designers Interior Environment Research Council was formed by President C. James Hewlett in September of 1967 for the scholarly collection, examination and distribution of information which may influence the performance of professional Interior Designers in establishing solutions for man's immediate environment, where he lives and works — and to stimulate new research in many areas which may be productive for interior designers. The chief concern of the Council is the study of man's response to his personal space.

This publication is the first in a continuing series to be published by NSID which will bring members of the profession insights from many disciplines which vitally affect the theory and practice of interior design.

Blanche Stewart, NSID
Chairman

Some New Bases and Needs for Interior Design
from Environmental Research
A Preliminary Survey
by Walter Kleeman, Jr., NSID, IBD
for
The NSID Interior Environment Research Council

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Proliferation of research which can form new bases for interior design is being accelerated in vast geometric proportions. Almost cursory investigations in the fields of psychology, anthropology, psychiatry, and biology (as well as interdisciplinary projects) turn up literally hundreds of studies, the results of which will vitally affect interior design. Generally speaking, the body of research can be separated into two parts:

I. Human Engineering and Measurement

This is usually referred to as "Human Factors" or "Human Factors Engineering" in the United States; in England and much of Europe it is called "Ergonomics." There are over 1500 members of the Human Factors Society headquartered in Santa Monica and the Society publishes the Journal of Human Factors there. In England the Journal of Ergonomics is published by the English, Dutch and International Ergonomics Societies.

Human factors engineering has been defined as the design of industrial machines, consumer machines and artifacts, as well as the design of military and space systems and vehicles so that they match human capacities and limitations, or in other words, so that man can efficiently operate them.

You will note the above use of the words "engineering" and design." At the moment from a surface perusal of the readily available literature, the emphasis in Human Factors studies is heavy on the engineering side. Perhaps this is because there are so many engineers engaged in the study of Human Factors, and also because of the very youth of the subject. In the beginnings of any major area of human concentration, basal measurements of many types must be taken and this is basically an engineering problem.

Although design concepts are important here, there is not as yet very much aesthetic material in the current Human Factors literature. Because of the necessarily rapid developments of military and space vehicles and systems, a surprisingly large body of physical and anthropometric data has been compiled and in a multi-disciplinary fashion. One good example is the Bioastronautics Handbook published by the National Aeronautics and Space Administration. The editor was a doctor of medicine who designs space suits, and the contributors include anthropologists, psychologists, engineers, and various behavioral research specialists.

While it is true that the assimilation and understanding of much of this data is more useful to purely product designers than to interior designers, it is information we must have as a basic need.

There are several other areas which come to mind here. While there are continuing studies and specialists in the areas of heating, air conditioning, lighting and the use of color, it might be well to point out that the interior designer frequently needs specialized knowledge from a combination of fields, or perhaps special information in just one field. We would like to see, for instance, a study of the acoustical effect of draperies by type of cloth, by type of finish, by type of construction, and so forth.

This is just an example of the type of knowledge interior designers need, but to bring it home to roost, consider this problem recently presented to us. A major conference room for a client is located at the perimeter of a building set back just four feet from a six lane highway. There is one large window in the conference room on the highway side, and for understandable reasons, the client wished to keep the window and to drape it. To complicate matters further, a traffic light for both vehicular and walking traffic was installed just 12 feet away from one end of the window in question. In this situation it was necessary that the drapes become a sound damp, and an efficient one, to block out vehicular stopping noise as well as the normal noises coming from the street.

We were lucky; we did it. We found, after some experimentation (very amateurish, to be sure) a light-opaque material which is also almost opaque to sound. We used normal common sense as to fullness, and the drapes do drag the sill and they work.

This is just one example. We have a rule in our organization; we don't specify any piece of seating unless we sit in it. This is a pathetic kind of rule, but we have to have it, simply because no other method is available to us to evaluate whether or not the product designer has done his job well. More and more comprehensive studies are needed here.

To some extent, the two needs above are symptomatic. It is quite possible that there is enough widely separated research in the various disciplines, which, properly related and correlated, would produce the desired knowledge; however, if it is available, it's not readily so.

The factor of noise generally in the interior environment might be included here. While a great deal of research has been done on the control of noise, there is wide disagreement as to the ideal sound factor. In some office environments, for instance 'white noise' (simply defined as artificial noise equally distributed among the audible frequencies) has had to be introduced thru the air conditioning system in order to mitigate the lack of background noise (which seems to be necessary for ideal working conditions).

There are studies which seem to prove that certain types of music in the sound background will increase production of factory workers, and there are also controversial studies in all directions concerning the efficiency of office workers with and without music backgrounds. Much needs to be done in this area, also. In this 'human factors' category, the durability of various artifacts and components would also fit. What do people do to upholstery fabric, springs, foam, laminates, etc., and how long does it take them to do it? This is knowledge generally available now only from experience, or a few isolated tests; unfortunately, neither the experience or the tests are often comparable or useful in terms of the project in hand.

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The second area of research is much harder to define, since most of the relevant studies are cross-disciplinary and multi-disciplinary in character. They include, but are not limited to anthropology, psychology, psychiatry, biology, medicine, statistics, and various forms of engineering. The more useful ones concentrate on human reactions to interior space and artifacts, but there are some seemingly peripheral ones which indicate some directions for the future and future research. Though it may seem obvious, it must be pointed out that the amount of interior space available to us is constantly being decreased by economic factors and the population explosion, and this cannot fail to increase the pressure on the interior design profession. Two specifics immediately come to mind which many of us design now, multi-purpose rooms, and multi-purpose artifacts; we'll be designing many more of these in the future.

One of the unquestioned leaders in trying to find some of the answers to the whys of human relationships in interior space in a changing world environment is Dr. Edward Twitchell Hall, a noted anthropologist, now professor of intersocietal communications at Northwestern University.

Dr. Hall is the author of many articles and books, including "The Silent Language" and "The Hidden Dimension." He is also the originator of the term and the study of "Proxemics." As defined by Dr. Hall, Proxemics is the interrelated observations and theories of man's use of space as a specialized elaboration of culture. Dr. Hall's hidden dimension is culture and his silent language is communication among humans without words, and though these explanations are a

gross over-simplification of his message, they may serve to indicate to us the need for increased awareness of the many factors, studies and theories which Dr. Hall weaves into his writing. Basically, Dr. Hall makes use of cross-disciplinary data to come up with new ideas about how human beings make use of and react to interior space, among many other things. If you read his works carefully, you can find clues to the arrangement of reception areas, for instance. In his development of "Proxemics," he has defined the distances at which humans react to other humans in various ways. Without going into his intensely interesting distance classification system in detail (which has far greater implications for interior designers than the following examples) it may be said that the distance between a receptionist and visitors will determine how much other work a receptionist will accomplish in addition to her function of greeting guests and getting them in to see the right person.

According to Dr. Hall's observations, a receptionist placed less than ten feet from the closest visitor is sufficiently involved with that visitor, even if she doesn't know him, that she feels that she is required to converse with him. If she is placed more than ten feet away, she can concentrate and get other work done. If space is not available to set the receptionist ten feet or more apart from her visitors, another solution is possible: arrange the seating so that the visitors face away from the receptionist. This will help. In our experience with the reception areas, we've found generally that greater utilization of space results when we do not use multiple seating pieces, which bears out other observations by Dr. Hall, that American strangers are quite reluctant to sit next to each other on a sofa unless forced to by crowding of the reception area.

Somewhat related to the above are some experiments conducted by a Canadian research team on conversational distance, that is, the maximum distance at which a conversation can be carried on in comfort while seated. Three and one half feet seemed to be the maximum distance. In this experiment, if the distance of seating pieces was allowed to become more than that, conversations were shifted to sofas and carried on side by side.

Arrangements of seats in a classroom have also undergone some analysis as have seating in public and semi-public dining rooms. One study determined, as might be expected, that acquaintanceships are determined by the initial seating pattern in a beginning class, that is, persons seated side by side tend to become acquainted first.

Studies of discussion interaction around various shapes of tables are inconclusive, except to point out that around round tables, persons across from each other are more likely to interact in discussion than persons seated next to each other. Rudimentary observations by trained observers have produced the notion and likelihood that rectangular or square tables are to be desired in nursery schools and geriatric facilities. Indications are that some of the territorial theories apply here; children and older people seem to need the security of definite table space which would not be provided by a round table. It is interesting to note, however, that another study shows a higher incidence of conversational interaction at the corners of the rectangular tables, both from the positions of the persons at the corners, and from the tendency of the more conversationally active people to sit there.

Some rather rudimentary research indicates that a change in classroom environment will produce changes in test scores. While superior students are affected least and while these changes appear to be somewhat associated with the material being learned and tested, nothing seems to have been done to relate the test results with the types of interiors as we think

of them, in terms of color, texture, light, artifacts and forms. This, it seems, might be a fertile field for further digging, and the results might be good for offices, too. It might be mentioned that some rather inconclusive studies have been made of the behavior of school children in successive years when their school was not repainted, was repainted in the traditional green wall, white ceiling mode, or was repainted in a combination of warm and cool colors recommended by a consultant. Although the improvements in the behavior of the children were very small in the green-white repaint atmosphere, somewhat greater in the warm-cool atmosphere, and non-existent in the static situation, there were improvements when walls were repainted.

There are also some school studies, which might apply to offices too, which indicate the probability that the ideal desk top should be textured plastic, in brown to beige tones to eliminate excess contrast of color and glare; these also indicate that the floor color should be probably a darker gray. Light reflection factors indicated here are from 35 to 50% for the desk and table tops and 15 to 30% for the floor. How many manufacturers of the materials you specify furnish reflectance factors for them?

Another major topic discussed by Dr. Hall in both "The Hidden Dimension" and "The Silent Language" is the frequently misunderstood communication which takes place in the differential use of space and the differential reactions to the use of space which take place in persons of different cultural backgrounds. Dr. Hall's research in Proxemics has led him to work with the U.S. State Department. For instance, Dr. Hall has found, among many other things, that our relationships with Arabs have been hurt by our lack of understanding of the distances and manner in which Arabs like to communicate. The Arab sometimes likes to breathe upon and smell the person with whom he is talking; the typical American finds this repugnant and sometimes feels that this invades his privacy. There are other cultures mentioned by Dr. Hall similar in this respect to the Arabs.

Consider, for a moment, how the above might affect the design of an office devoted to business between Americans and the Arabs. The familiar and typical desk credenza or table and credenza would not do, unless another area were available for closer contact, since the desk or table might be just a barrier to communication. American office space for Americans has also been closely observed by Dr. Hall. In order that the occupant of an American office will feel that the space is sufficient, he finds that it must not only be large enough to contain the desk, chair and other necessary occupational equipment as well as room to move around them in, but it also must contain enough space so that the occupant can move his chair away from the desk a foot or two without rising.

Certainly the feeling of the occupant about the size of his office is an important factor in client satisfaction, and using these observations as a basis, it would now be possible to develop from this and other available anthropometric data minimal comfort sizes of offices depending on how many persons are to use them and the amount and volume of necessary equipment.

The example of the Arabs above is an oversimplification, but an example; however Dr. Hall proceeds to many more differences of perception and interaction among humans with different cultural heritages. Among other, Dr. Hall discusses the difficulty of communication between the typical Southerner who moves into a large northern city, and the people who already live there.

We recently were called in very late in the process to try to rectify the following situation:

A college with a body of students composed of almost all former slum dwellers was faced with widespread negative student reactions to a new dormitory; they

asked us what could be done with the interior to cure the situation.

The dormitory and its interior had been designed by architects in absentia — geographically and sociologically. Evidently, no effort had been made to culturally identify the students who would occupy it. The outer appearance of the building to the educated faculty eye resembled a fort, or a hydroelectric dam — essentially strong, permanent looks with much use of exposed concrete. The writer is sure that the slum-dweller's eye looks upon it and he hears a silent shout: JAIL.

Inside, the architects used the device of leaving the board marks on the surface of the concrete walls of the stairway wells; textural interest for the educated eye; instant association with damp basements for the former slum inhabitant.

Very simple tables and seating in neutral colors were used with clean lines. Again, the faculty view was aesthetically good; the slum dwellers view was one of alienation; the interior artifacts were too far from their frame of reference, and in their view, were too "spindly" to hold up. The grayness of the outside and inside concrete, the grey blue of the interior exposed unpainted cinder block (basement association here also), the typical dropped segmented white ceiling, and the bareness of a recently cleared new site were relieved only by a vibrant red carpet, which only served to point up the surrounding drabness.

We were able to introduce well-designed but much more massive tables and seating in warm colors and patterns; highly patterned and colored draperies plus more suitable carpet have also been specified. The installation is only begun as this is being written, but the protests have been abated, for the present at least.

From this experience, we are able to surmise that these University students found the objectionable interior not what they believed a University Interior should be. It was alien to their expectations.

This factor of possible alienation is present in all interior design, and it is this writer's belief that the problem can be serious. It is certain that it can vitally affect the work and learning progress of human beings. Even more serious perhaps is the factor of disorientation, which can be produced by overcrowding.

From Dr. Hall's work and from others comes one idea (among many others) too important to be ignored: Disorientation is an ever present danger, perhaps to human life itself.

Repeated and varied studies of rats, deer and other animals indicate that the overcrowding just in terms of physical living space will first produce disorientation, then stress and death. Autopsies have shown easily measurable changes in vital organs which can be linked to psychological stress patterns. Dr. Hall has expressed a desire for a continuing series of autopsies of humans who have lived and died in the crowded slums — to try to find out whether or not the same results observed in various species of animals are repeated in humans.

Certainly the statistics concerning the health of those who live in the slums are startling enough. Slum dwellers have three times the incidence of heart disease as other Americans, five times the mental disease and four times the high blood pressure, according to U. S. Government studies. It's no wonder Dr. Hall wants to look further.

The usual methods used in getting rid of slums perhaps leave much to be desired. When the slum dwellings are bulldozed, usually neighborhood stores and meeting places are bulldozed also; the slum dweller loses all his familiar points of reference and social activity, which contributes to disorientation. It is per-

haps significant that there are experiments going on now which involve the rejuvenation and/or restoration of the interiors and exteriors of existing dwellings on a blitz basis with the inhabitants moved to a hotel for a week; they then return to refurbished dwellings, and the neighborhood points of reference intact. The challenge to interior designers in this situation is quite apparent.

From the anthropologists, we turn to still another discipline, the management consultants — from them has come a new design for offices — Office Landscape, or in Germany Burolandschaft or in Sweden Kontorlandskap. The originators were the Quickborner team, a group of management consultants from near Hamburg, Germany headed by Wolfgang and Eberhard Schnelle. Their central ideas was economic — to improve the efficiency of the office and assist management development. Beyond the initial objective of improving communication and work efficiency, Office Landscape procedures make possible continuing change and adaptation of the use of space so that moves can be made as the business changes or as the need for change occurs through evolution of functions and needs of the business.

As you look at it for the first time, Office Landscape looks almost hopelessly random with no partitions and a nonrectilinear desk and file pattern. As a matter of fact, done properly, it becomes almost a painstaking study of communications and relationships between and among people in the office. The planning is then done so that there is the most effective relationship among the workers in the office — and most important, provisions are made so that study of relationships and functions can continue. In this way, the Office Landscape can remain up to date as the data is continuously reevalued, and as functions of people change.

My own firm has been faced with interior design problems similar to those solved in the examples of Office Landscape we have seen. We have not felt, however, that we are competent management consultants; we have turned down a project or two because of this, feeling that a management consultant should have been called upon to do a part of the work.

This situation pinpointed for us the need for readily available management consultants, and the other problems outlined above have similarly spotlighted the need for the harnessing of many disciplines in the successful execution of professionally done interiors.

We are then back to the concept of the interior designer as the job captain, since no one person can be master of each of the multi-disciplinary knowledges necessary for each specialty. This job captain must be aware of and familiar with the growth of knowledge in the behavioral sciences — and he must be ready to call upon each specialist as needed.

Some of these specialists are:

1. The acoustic engineer.
2. The thermal engineer.
3. The lighting engineer.
4. The anthropologist.
5. The psychologist.
6. The management consultant.
7. The architect.
8. The city planner, or the practitioner of Ekistics.
9. The physician.
10. The psychiatrist.
11. The lawyer.

The above list is not given in order of importance, simply because it is impossible to predict the order of importance of these specialists. (Not only do they have to be specialists, but they also have to have the open, multi-disciplinary approach necessary to contribute real knowledge to a problem.) This list isn't complete, either; it's merely the principal sources of needed knowledge. (At times we've had to call in a chemist, for instance, to solve a particular problem.)

It should be mentioned parenthetically that there are variants for the above professions which go under other names, are specialties within them, or are cross-disciplinary combinations of them. You will note among the specialists listed above, "the practitioner of Ekistics." The word "Ekistics" is defined by its originator, Constantine A. Doxiades as "the science of human settlements." The practitioner of Ekistics is not necessarily a city planner as we are familiar with the term, since Ekistics as a discipline has drawn contributions to its Journal from Buckminster Fuller, as well as the aforementioned Dr. E. T. Hall. It is important to note that Ekistics is attracting to its discussions some of the most trenchant thinking of today; its multi-disciplinary approach could set an example for the interior designer.

In his enunciation of the principles of Ekistics, Doxiades stresses that all concerned must be aware of the many kinds of satisfactions that an ideal environment must provide in order to be successful; he obliquely mentions that somebody has to be the boss; he pinpoints the fourth dimension of time, change and growth as the previously neglected one; and he tells us that man must be the controller and must plan for the ways in which the artifacts of our civilization must be put into their rational places. Doxiades' patterns are fluid ones; it is this writer's opinion that a similar fluid pattern must be brought to bear on the theories and practices of interior design. This will be essential because:

1. As indicated above, research from many directions can be brought to bear on interior design; we have not touched on the continuing progress of the material technology of interior artifacts, but this too demands constant assimilation and understanding by the interior design profession.
2. Stimulated by the progress of knowledge and communication (McLuhan) living patterns are changing faster in the present than ever before; for instance, the advent of tribal living (not among Indians) in the United States presents a set of unique problems for interior designers.

In this brief survey, we have attempted to pinpoint some of the research directions which will affect the future course of interior design. One thing is sure: a multi-disciplinary approach will assure our continued progress.

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